REMARKS

A. INTRODUCTION

In the Office Action dated March 21, 2006:

Claims 19-26, 49, 50, 53 were allowed;

Claims 27-33, 41-48, 51, 52 were rejected with claims 27, 45, 51, 52 being rejected under 35 U.S.C. § 103(a) over U.S. patent no. 6,462,498 by Filo et al. (hereafter "Filo") in view of the reference entitled "A Structure-from-motion Algorithm for Robot Vehicle Guidance" by Han Wang et el. (hereafter "Wang"); and

Claims 1-7, 9-18, 34-40 were objected to on grounds they do not particularly point out and distinctly claim the subject matter regarded as the invention.

B. OBJECTION TO CLAIMS 1-7, 9-18, 34-40

Examiner has required correction of the terms "gradient-magnitude smoothed first image pixel data" and "gradient-magnitude smoothed second image pixel data," which are present in claims 1-7 and 9-18. Applicant is amenable to revision of these claim terms in accordance with Examiner's comments.

C. REJECTION OF CLAIMS 27-33, 41-48, 51, 52 UNDER 35 U.S.C. § 103(a)

Applicants submit that claims 27-33, 41-48, 51, 52 of the present application are patently distinguishable with respect to the combination of Filo and Wang because there is (1) no motivation to combine these references and (2) no expectation that such a combination would be successful at the time of the invention.

In rejecting claim 27, for example, Examiner asserts that one of ordinary skill in the art would have found it obvious to modify Filo to "determine the perceived motional state of the robot using visual data from a camera coupled to the robot" instead of the current sensor found in Filo, and that such a method "for determining an actual motional state is considered ***substantially equivalent*** to Filo's method for determining when the robot has become stuck since both Wang's and Filo's methods are capable of effectively determining when a robot is not moving..." (emphasis added).

Applicants respectfully disagree with Examiner's assertion that modification of Filo to determine the perceived motional state with visual data was obvious to one of ordinary skill in the art. A person of ordinary skill in the art would generally be discouraged from employing visual data to determine when a robot was stuck because visual data can present a significant challenge to work with as compared to actuator current signals:

(1) Visual data requires ***significant computational resources*** to collect and pre-process before it is useful for detection of motional state. This computation includes filtering and comparison of vast amounts of image/video data. A person of ordinary skill would be discouraged from modifying Filo to perceive the motional state with visual data because it would require a significant *increase* in processing capability (and power consumption) in comparison to a current-based system.

(2) Determination of motional state with visual data requires a camera, for example, to collect the data. A person of ordinary skill would be discouraged from modifying Filo to include a camera because it would increase the number of systems, ***increase the robot's complexity***, and could increase the robot's chance of failure.

A motional sensor based on visual data is ***not equivalent*** to a motional sensor based on current, and a person of ordinary skill would not be motivated to modify Filo to perceive the motional state with visual data, for the following reasons:

(1) A motional sensor based on visual data can function substantially different than a current sensor in environments with little or no texture. If the environment lacked texture because there were no visible features in the field of view, for example, the Filo robot equipped with a Wang visual sensor could have ***difficulty definitively determining its motional state*** and may fail to detect when the robot became stuck.

(2) A motional sensor based on visual data also functions substantially different than a current sensor when the robot's leg or drive wheel slips/spins when stuck. If the robot gets stuck because its leg slips or the drive wheel spins when on a slippery surface, for example, the ***actuator current may not increase*** and the robot would fail to detect that it is stuck. In contrast, a robot with a motional sensor based on visual data can detect the absence of movement regardless of whether the leg slips or wheel spins.

Claims 28-33, 41-48, 51, and 52 are non-obvious for at least the same reasons discussed above. Applicants respectfully assert that these claims are allowable and request that the rejection based on Filo and Wang be withdrawn.

D. SUMMARY

In view of the foregoing remarks, Applicants respectfully request that the Examiner withdraw the rejections of Claims 27-33, 41-48, 51, and 52. Accordingly, Applicants respectfully request the Examiner to pass the present application to the issue process.

Respectfully submitted,

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By: Andrew S. Naglestad

Andrew S. Naglestad
Registration No. 47,814
130 W. Union St.
Pasadena, CA 91103
(626) 685-4991